

EDAM Non-Proliferation Policy Briefs 2013/1



Turkey's Missile Programs: A Work in Progress

Aaron Stein

Research Assistant, EDAM

This study was commissioned by the Nuclear Security Project (NSP) of the Nuclear Threat Initiative (NTI). The views expressed in this report are entirely the authors' own and not those of the Nuclear Security Project. For more information, see the NSP website: www.nuclearsecurity.org

January 2013

Introduction

Turkey is amid a decades old program to modernize its armed forces. During the Cold War, Turkey's military was focused on maintaining a large standing army capable of defending against a Warsaw Pact invasion. Beginning shortly after the collapse of the Soviet Union, Turkish military planners began to take steps to field a smaller and more professional military. These reforms have included a sustained commitment to procuring and developing cruise and ballistic missiles. The cruise missile program, while still in its infancy, is intended to give the TSK the option to strike with precision a variety of regional targets. The purpose of the ballistic missile program, while different in scope, also appears aimed at giving the TSK more flexibility to attack surface targets. These two programs have moved in parallel to Turkey's efforts to develop unmanned aerial vehicles (UAVs or drones), which Ankara believes are vital to more effectively combat the Kurdistan Workers Party (PKK).

Ankara has also remained committed to purchasing missile defenses. Turkey, despite having procured short-range surface-to-air missiles, does not currently have any systems designed to counter ballistic or cruise missiles. As countries in the region continue to augment their Scud based arsenals, Turkey has continued to seek out ways to defend its territory. Thus, the acquisition of missile defenses, combined with the ability to strike targets with precision remains a high priority for the TSK. Turkey's missile programs, however, are still dependent on assistance from foreign suppliers and have only recently been pursued with urgency by the Turkish government. Nevertheless, Ankara is keen on taking a longer-term approach to its missile production programs and aims to develop the capability to manufacture the missiles locally. Ankara, therefore, is likely to continue in its efforts to secure favorable technology transfer agreements from foreign suppliers, rather than simply opt to purchase a slew of missile systems without receiving any co-production or transferred technology in return. This posture suggests that Ankara, while intent on bolstering Turkish capabilities, remains committed to realizing its long-standing goal to become more militarily independent. Thus, the missile program has two purposes: 1) to augment Turkish defenses by giving the TSK more options to strike targets; 2) bolster Turkey's large, but relatively uncompetitive, defense sector.

Towards a New Military Doctrine: Cruise Missiles and UAVs

For much of its history, the Turkish Republic has been combatting Kurdish insurgents. The fighting generally slows in the winter months and begins to pick up again in the spring and summer. The Turkish military has struggled to continue operations year round, in all weather conditions, and at night. To help overcome these difficulties, the TSK has been investing in military systems designed to increase its ability to monitor PKK camps and to attack targets at any time. As the United States has ramped up its production and reliance on drones, Turkish military planners have followed suit, and have identified UAVs as critical for its fight against the PKK.

Turkey first began studying UAVs in the early 1990s. These early efforts included work on airframe design, software and communication sub-systems, and studies about how best to integrate manned aircraft systems on to unmanned platforms. Turkey's initial research and design work culminated in the 2004 tender for the production of a medium altitude long endurance (MALE) UAV. The Turkish armed forces mandated that the UAV be outfitted with cameras capable of surveillance in all weather conditions, as well as the capability to fly above 30,000 feet for at least 24 hours. The contract was awarded to Turkish Aersospace Industries (TAI), which has since dubbed the UAV the Anka. While little information has been released about the UAVs development, reports indicate that the Anka has not performed well during testing. The drone has reportedly crashed on multiple occasions, which suggests that it has stability issues.¹ Nevertheless, the TSK claims to use the Anka for a limited number of sorties in the southeast and Northern Iraq. TAI has announced plans to build an armed variant and hopes to export the Anka in the near future.

Turkey has also sought to purchase a number of different UAVs from foreign suppliers in Israel and the United States. Turkey first imported the General Atomics made Gnat in 1995. The UAV was designed in the late 1980s and was employed by the United States for surveillance during the 1990s. The drone was eventually replaced by the Predator, but was relied upon for intelligence, surveillance and reconnaissance (ISR) work by both the Central Intelligence Agency and the U.S. Military. Turkey has imported 22 Gnats and is estimated to still use a limited number for missions in the southeast.

Turkey also purchased the Israeli made Aerostar, Heron, and Searcher UAVs. The TSK has since relied almost exclusively on the Heron to monitor PKK targets in the southeast and on the border with Iraq, Syria, and Iran. The Heron is a medium altitude long endurance UAV system capable of flying between 10,000 and 30,000 feet for up to 52 hours. Ankara first concluded the deal for the supply of the drone in 2005, but the delivery was delayed until 2010. The delay in delivery was reportedly due to problems integrating Turkish made components on the Israeli made airframe. More specifically, the "Aselsan's Aselfir 300T turret of electro-optical cameras, infrared, and laser rangefinder/trackers weighs 93 kg/ 205 pounds, which is significantly more than the 145-155 pound IAI MOSP turrets used by the Israelis, or the similar 155 pound AAS-52 system carried by the Predator."² The added weight reportedly limited the Heron's ceiling and endurance, which brought it below the thresholds called for in the original Turkish tender. The Israeli consortium tried to compensate for the added weight by increasing the power of the engines, but the delivery was still delayed. To help meet the TSK's immediate needs, Turkey leased three Aerostar UAVs in 2007. The drones were delivered in 2008 and were used as a stopgap until the Heron's were eventually delivered in 2010. Israel also sent teams of technicians and operators to Turkey to train TSK staff,

¹ David Cenciotti, "Prototype of Turkey's first armed drone crashes during test flight. Again," *The Aviationist*, 1 October 2012, <http://theaviationist.com/2012/10/01/anka/>; "Unmanned air vehicle ANKA fails final test," *Hurriyet Daily News*, 29 September 2012, <http://www.hurriyetdailynews.com/unmanned-air-vehicle-anka-fails-final-test.aspx?pageID=238&nid=31278>.

² "Israeli Manufacturers' Turkish UAV Contract," *Defence Industry Daily*, 22 December 2011, <http://www.defenseindustrydaily.com/israeli-manufacturers-win-150m-turkish-uav-contract-updated-0389/>.

but they were sent back in June 2010, following the killing of 9 Turkish citizens on board the Mavi Marmara.

Turkey has also made it a priority to purchase the U.S. made Predator drone. Ankara is reported to have requested “four General Atomics MQ-1 Predator drones and six MQ-9 Predators, some which would have armed capability.”³ President Barack Obama is reported to support the Turkish request, but has told Turkish officials that the U.S. Congress is unlikely to give its consent to any deal involving armed drones because of Turkey’s troubled relationship with Israel.⁴ Moreover, Turkey would also have to contend with the United States’ complex export control laws, which place numerous restrictions on the sale and export of dual-use items like UAVs.⁵ While there are signs that the U.S. is working to streamline these laws, the legislation appears aimed at relaxing restrictions on the export of unarmed drones. Nevertheless, Ankara continues to press the United States to sell it the armed version of the Predator. Turkey’s efforts, however, are not likely to succeed. Ankara will therefore have to continue to try and develop its own armed version of the Anka. The United States, however, has agreed to provide Turkey with four unarmed Predators. The drones are stationed at Incirlik air force base and operated by pilots from the private U.S. contractor Battlespace Flight Services.⁶ The drones are used to monitor PKK activity in the southeast and Northern Iraq and have been used to help identify targets for air strikes. The drones remain under control of the United States, even though they are deployed in Turkey and are being used for Turkish military missions.

In tandem with its efforts to develop and procure UAVs, Turkey has also invested in a cruise missile program. Turkey first purchased the U.S. made Harpoon anti-ship cruise missile in 1986. The missile has a range of greater than 60 nautical miles and is primarily used for coastal defense against surface ships. The TSK also purchased 25 MM-38 Exocet anti-ship cruise missiles from France in 2000. The missile has a range of 40 km and its engine is reported to be the basis for Turkey’s indigenous turbojet engine program.

Despite Turkish interest in procuring missiles from abroad, Ankara’s poor human rights record and its technology transfer demands has limited Turkish military imports. In the late 1990s, Turkey increasingly turned to Israel for many of its more advanced military arms. In 1997, Turkey’s Roketsan and Israel’s Rafael signed an agreement to co-produce

³ Jim Zanotti, “Turkey – U.S. Defense Cooperation: Prospects and Challenges,” Congressional Research Service, 8 April 2011, <http://www.fas.org/sgp/crs/mideast/R41761.pdf>.

⁴ Emre Peker, “Turkish Bid for Drones Stalls in Congress, President Gul Says,” *Bloomberg News*, 22 May 2012, <http://www.bloomberg.com/news/2012-05-22/turkish-bid-for-drones-stalls-in-congress-president-gul-says.html>.

⁵ Doug Palmer and Jim Wolf, “Pentagon OK with selling US drones to 66 countries,” Reuters, 6 September 2012, <http://usnews.nbcnews.com/news/2012/09/06/13695931-pentagon-ok-with-selling-us-drones-to-66-countries?lite>.

⁶ Micah Zenko and Emma Welch, “Where the Drones are,” *Foreign Policy.com*, 29 May 2012, http://www.foreignpolicy.com/articles/2012/05/29/where_the_drones_are?page=0.1.

the Popeye-II cruise missile.⁷ The air-launched cruise missile has a range of 150 km. While little is known about the co-production program, Turkey did purchase 46 AGM-142A/Popeye-I cruise missiles in 1998.⁸ The 80 km range missiles were delivered in 2002 and have been deployed on Turkish F-4s. Turkey also purchased 108 Israeli made Harpy UAVs in 1999 for \$76 million dollars.⁹ The unmanned system is designed to attack and destroy air defenses by loitering over a pre-programmed target and searching for enemy radar emissions. Once the target is identified, the Harpy enters attack mode and dives toward the target. The UAV's warhead is designed to explode just meters above the target to maximize the blast radius and ensure the destruction of the radar's antenna.¹⁰

To help meet its self-imposed goal of becoming less dependent on foreign suppliers for military equipment, the Turkish government has set aside research and development funds for the development of an indigenous cruise missile. TÜBİTAK Sage, Defense Research and Development Institute of Turkey, signed an \$80 million dollar contract for the development of the modular standoff missile (SOM). The program began in 2006 and the first flight test was conducted over the Black Sea in 2010. The missile was fired from a F-4 in 2011 and is reported to have flown 185 km and hit its pre-programmed target.¹¹ SOM is powered by the French built Microturbo TR-40 turbojet engine.¹² In 2011, Turkey awarded a contract to Kale Aero for the local production of a replacement turbojet engine. The engine is expected to combine the best attributes of the TR-40 with systems thought to be similar to the Teledyne CAE J402 series used to power the U.S. Harpoon.¹³ Turkey has indicated that it intends to extend the SOM's range up to 1,500 km.

Turkey's Ballistic Missile Program: From Unguided Rockets to Battlefield Missiles

Turkey has been developing missiles and unguided rockets since the 1980s. According to Yiftah Shapir and Gallia Lindenstrauss, Turkey first developed "the T-107, a 107 millimeter (mm) caliber rocket for infantry and commando units, and the T-122 Sakarya, a 122 mm caliber rocket (developed with the assistance of Yugoslavia) in the early 1990s."¹⁴ Turkey, like other countries, has used the experience gained from its unguided rocket program for the development of ballistic missiles. Ankara had initially sought to

⁷ Philip Robins, *Suits and Uniforms: Turkish Foreign Policy Since the Cold War* (London: Hurst & Company), 198 – 200.

⁸ SIPRI Arms Transfers Database, Transfers of major conventional weapons: sorted by supplier. Deals with deliveries or orders made for year range 1990 to 2011, Information generated on 10 January 2013.

⁹ Ibid.

¹⁰ "Harpy Air Defense Suppression System," Defense Update: International Online Defense Magazine, updated 4 March 2006, <http://defense-update.com/directory/harpy.htm#cont>.

¹¹ "Turkish cruise missile design breaks cover," *Flight Global: Aviation Connected*, 14 September 2011, <http://www.flightglobal.com/news/articles/dsei-turkish-cruise-missile-design-breaks-cover-362026/>.

¹² "Kale Aero will develop indigenous turbojet engine for SOM ALCM," *Monch Turkiye*, accessed 4 January 2013, http://www.monch.com.tr/index.php?option=com_content&task=view&id=158.

¹³ Ibid.

¹⁴ Yiftah Shapir and Gallia Lindenstrauss, "Plotting the Trajectory of Turkey's Ballistic Missile Program," WMD Junction, The James Martin Center for Nonproliferation Studies, 4 November 2012, http://wmdjunction.com/121102_turkey_ballistic_missiles.htm.

partner with the United States for the co-development of a system similar to the U.S. Army's Tactical Missile System, but the two sides could never reach an agreement on the terms of technology transfer.¹⁵ Despite these problems, Turkey purchased 72 MGM-140A ATACMS surface-to-surface missile batteries from Lockheed Martin in 1996.¹⁶ The missile was first developed in 1982 and is the only surface-to-surface missile to be used in combat. The missile has a 300 km range and is outfitted with a GPS aided inertial guidance system.¹⁷ The missile was designed to target and destroy SAM sites and command and control centers, though there is no open-source information about its use by the TSK.

Ankara, which continues to pursue a military procurement policy based on tech-transfer and co-development, opted to turn to China for the supply and co-development of rockets and missiles. Turkey, with the assistance of technology transfer from Chinese companies, first produced the 100 km range T-300 Kasirga artillery rocket.¹⁸ The two sides also cooperated on the development of Roketsan's J-series short-range ballistic missiles. The J-600 T Yildirim is based on China's WS-1 unguided rocket system. The missile is reported to have a range of 150 km with a warhead weighing 480 kg. The J-600 relies on a GPS and inertial guidance system and is reported to have a circular error probability of 75 meters.¹⁹ The TSK is reported to have six batteries in operation, though there is no open source information about their use in combat. The Chinese WS-1 is designed to attack large-scale surface targets and features a warhead designed to attack enemy armor, which suggests that the TSK believes that the missile could be an effective weapon against surface-to-surface targets and tank formations.²⁰

In 2011, the Turkish government announced plans to develop a 2,500 km range ballistic missile. Little information about the program has been released, though the government has indicated that it would like to use the proposed missile for satellite launches as well as to help bolster Turkish defense capabilities. TÜBİTAK-Sage has been awarded the development contract and has indicated that it intends to test a prototype within the next two years.²¹ However, this development plan appears to be overly ambitious. Moreover, the Turkish government has not been forthcoming with information about the program's ultimate intent. While Turkish officials have indicated a desire to have an independent capability to launch satellites, the military aspects of the program have not been released.

¹⁵ Ibid.

¹⁶ SIPRI Arms Transfers Database, Transfers of major conventional weapons: sorted by supplier. Deals with deliveries or orders made for year range 1990 to 2011, Information generated on 10 January 2013.

¹⁷ ATACMS: Long Range Precision Tactical Missile System, Lockheed Martin Fact Sheet, 2011, <http://www.lockheedmartin.com/content/dam/lockheed/data/mfc/pc/atacms-block-1a-unitary/mfc-atacms-block-1a-unitary-pc.pdf>.

¹⁸ Ibid.


¹⁹ Project J (J-600T), Missile Threat, A Project of the George C. Marshall and Claremont Institute, updated 13 November 2012, <http://missilethreat.com/missiles/project-j-j-600t/?country=turkey#turkey>.

²⁰ WS-1 WeiShi [Guardian], Global Security.org, page last modified on 7 November 2011, <http://www.globalsecurity.org/military/world/china/ws-1-specs.htm>.

²¹ Umit Enginsoy, "Turkey aims to increase ballistic missile ranges," *Hurriyet Daily News*, 1 February 2012, <http://www.hurriyetdailynews.com/turkey-aims-to-increase-ballistic-missile-ranges.aspx?pageID=238&nID=12731&NewsCatID=345>.

The government instead has vaguely said that the missile will be used to bolster Turkish defense, but has not specified the rationale for the proposed missile program.

Long Range Air Defense Systems: Slow Progress

In addition to its offensive missile programs, the TSK has also sought to purchase missile defenses to help protect against the proliferation of Scud derived missiles in the Middle East. Ankara first approached Israel for the sale of its Arrow missile defense system in 1997; however, the proposed deal was cancelled after the Turkish financial crisis in 2001. In 2009, Turkey announced a second tender for the supply of a long-range air and missile defense system. Ankara is currently reviewing bids from Eurosam, maker of the Surface-to-Air Missile Platform/Terrain Aster 30; the U.S. partners Raytheon and Lockheed Martin, maker of Patriot-based air defense systems; Russia's Rosoboronexport, marketing the S300; and China Precision Machinery Export-Import Corp., offering its HQ-9. The tender, however, has dragged on and Turkey does not appear to have made any discernable progress towards picking a winner. Ankara has argued that it will make a decision based upon the best offer; however, the Chinese and Russian systems are incompatible with NATO systems. Thus, Turkey is widely believed to prefer either the U.S. or European system because they can be integrated into NATO's planned missile shield. 

Turkey currently operates the American Hawk anti-aircraft system and the British Rapier. These systems, while very adept at intercepting aircraft, do not have any capability against ballistic and cruise missiles. In January 2013, Turkey delayed its decision for the missile defense tender and indicated that it would hold no further meetings on the topic.²² After nearly five years, the Defense Industry Implementation Committee (SSİK) announced that it would encourage local producers to develop an anti-missile system.²³

Turkey has not announced the scope of its missile defense plans, or any timeframe for its development. However, in June 2011, Aselsan, Turkey's largest defense company, was awarded a \$1 billion dollar contract to develop all radar, fire control, command-and-control and communication systems for both the low-level and medium-altitude components of Turkey's planned missile defense system.²⁴ The tender was followed by a December 2011 announcement by Prime Minister Erdogan calling on TÜBİTAK to develop a long-range missile shield to be built by Turkish industries.²⁵

²² "Turkey's defense committee delays decision on air defense system," *Today's Zaman*, 4 January 2013, <http://www.todayszaman.com/news-303044-turkeys-defense-committee-delays-decision-on-air-defense-system.html>.

²³ "Gov't undecided on missile contract but favors local developers," *Today's Zaman*, 4 January 2013, <http://www.todayszaman.com/news-303094-govt-undecided-on-missile-contract-but-favors-local-developers.html>.

²⁴ Burak Ege Bekdil and Umit Enginsoy, "Aselsan Wins \$1B Turkish Air Defense Contract," *Defense News*, 23 June 2011, <http://www.defensenews.com/article/20110623/DEFSECT01/106230308/Aselsan-Wins-1B-Turkish-Air-Defense-Contract>.

²⁵ "Turkey to beef up missile system relying on Turkish industrial sources," *Today's Zaman*, 29 December 2011, <http://www.todayszaman.com/news-267131-.html>.

Conclusion

Turkey has taken a number of significant steps to procure and develop cruise missiles, ballistic missiles, and UAVs. Ankara has relied on technology and purchases from foreign suppliers to meet its goals. The program appears aimed at giving the TSK more flexibility to target the PKK and, in the case of the ballistic missile program, a platform for a variety of missions ranging from a nascent space program to targeted strikes against large surface targets. However, it is still unclear if Turkey needs a ballistic missile program. Ankara has not been forthcoming about the ultimate intent of the program. If Ankara continues ahead with the program, the missile's development will likely be a source of concern in the international community. Ballistic missiles serve little purpose when outfitted with conventional warheads, thus raising a number of questions about how a long-range ballistic missile will be used.

Turkey's missile program still depends, to a large extent, on foreign assistance and technology transfer. Ankara hopes that its insistence on substantial technology transfer from its suppliers will help jump-start Turkey's own domestic arms industry. Once Turkey gains the experience needed to manufacture its own missiles, Ankara intends to deploy them with the TSK and to expand its share of the global arms market. Thus, the program, while ostensibly aimed at deepening Turkish capabilities, is also aimed at further developing Turkey's industrial base. Moreover, the systems are designed to operate on NATO platforms, which further suggests that Ankara remains committed to trans-Atlantic security framework. However, Ankara would also like to break free from its reliance on foreign military suppliers so that it can have more flexibility when executing its foreign policy. Turkey is unlikely to alter its approach to arms sales, which up until this point have demanded both favorable technology transfer terms and specific allotments for Turkish designed systems. This approach further indicates that Ankara is not just interested in purchasing foreign made military systems, but also in gaining the knowledge to bolster its indigenous capabilities.